



SUSTAINABLE TECHNOLOGIES AS A BASIS OF CLEANER PRODUCTION

**Vineta Srebrenkoska¹, Kiril Lisichkov², Emilija Fidancevska²,
Jadranka Blazevska Gilev²**

*¹Faculty of Technology, Goce Delčev University, Štip, Republic of
Macedonia,*

*²Faculty of Technology and Metallurgy, Sts. Cyril & Methodius
University, Skopje, Republic of Macedonia*

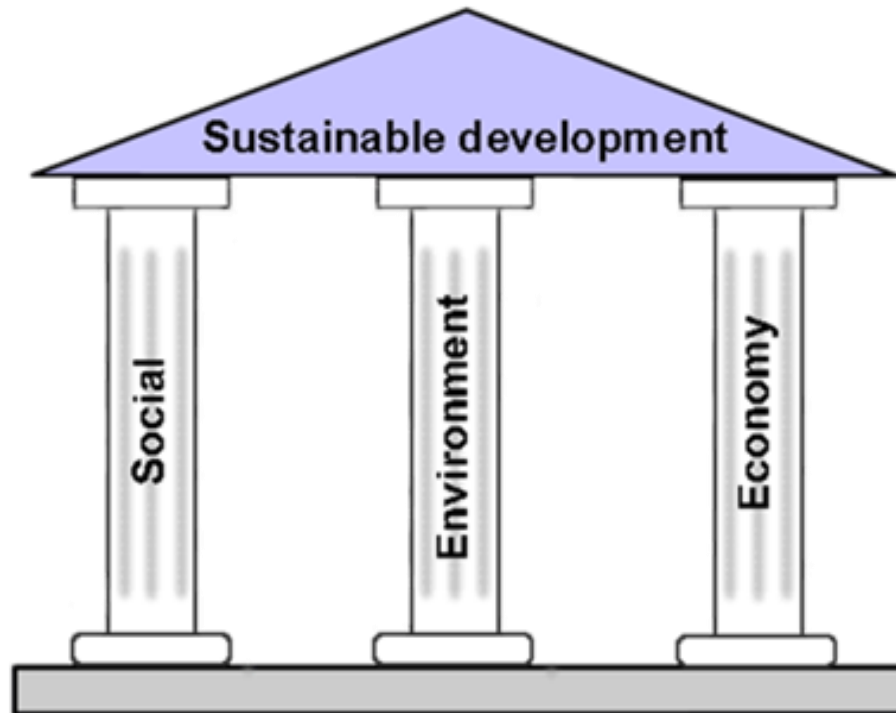
ABSTRACT

The aim of the present work is characterization of the clean technology and cleaner production in relation to sustainable development and environmental requirements. The paper describes the general cleaner production aims, which correspond to the prevention criteria of the IPPC-Directive. It presents cleaner production practises and technologies and examines the methods of successful application of cleaner production practises in companies, which want to realize proecological targets. Sustainable technology is usually connected with the design and analysis of complex, integrated management systems and sustainable development and it is a central target in environmental science and growth of global economies. Environmental improvement of companies strategy by application the idea of cleaner production linked with sustainable technologies leads to produce environmentally friendly products and leads to increase the position of company on the market.

Key words: theoretical fundamentals of cleaner production; clean technology; sustainable development.

Sustainability

- is a dynamic concept
- it requires decision makers to be flexible and willing to modify their approaches according to changes in the environment, human needs and desires, or technological advances.



Ensuring sustainability over time means:

- dynamic balance among a growing human population and its demands,
- the changing capabilities of the physical environment to absorb the wastes of human activity,
- the changing possibilities with application of new knowledge and technological changes and the values, aspirations and institutions that make human behaviour adequate to changes.

Visions of a sustainable world must naturally change in response to shifts in any part of this dynamic relationship.!!!



Sustainable technology

The minimization of waste and reductions in material and energy inputs are the most important environmental aims.

Sustainable technological development and innovations do not automatically lead to total reduction of environmental burden of industrial production.

However, technological innovation is an important factor and seems to play a central role in the long-term initiation of cleaner production.

Sustainable technologies

- use less energy,
- fewer limited resources,
- do not deplete natural resources,
- do not directly or indirectly pollute the environment, and
- can be reused or recycled at the end of their useful life.



- *Optimization of the environmental performance through good housekeeping,*
- *Total quality management,*
- *Application of end-of-pipe techniques,*
- *Recycling of wastes,*
- *Non-renewable products substitution or adaptation clean technological innovations.*

To reduce the environmental burden of industrial production



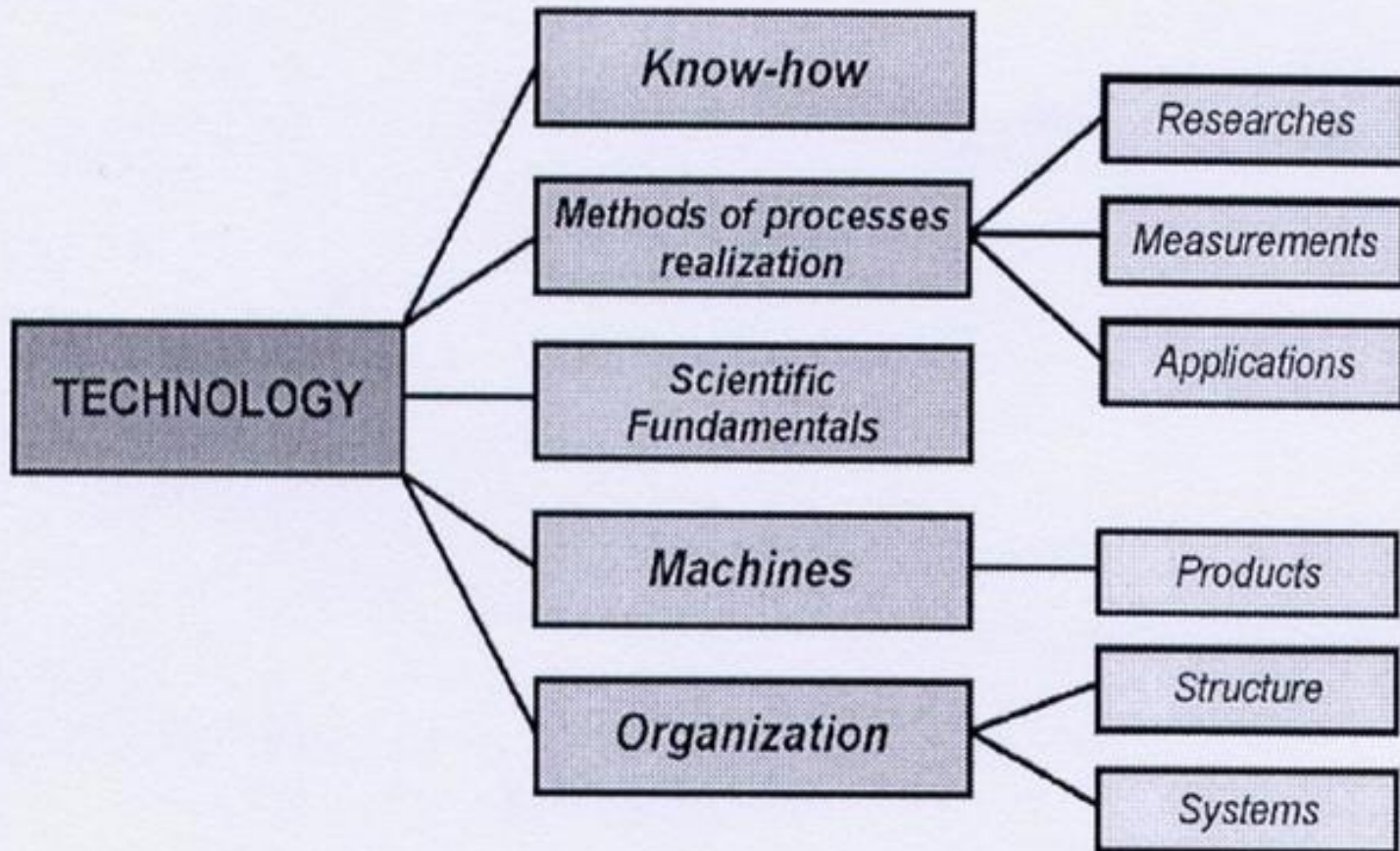
Clean technology is the most important factor for economic growth of industries - main role in sustainable development.

The development of clean technology seems to be the main factor of company's strategy.

Each companies, which want to reach the competitive position on the market and want to be environmental friendly should compile the strategy of technology!!



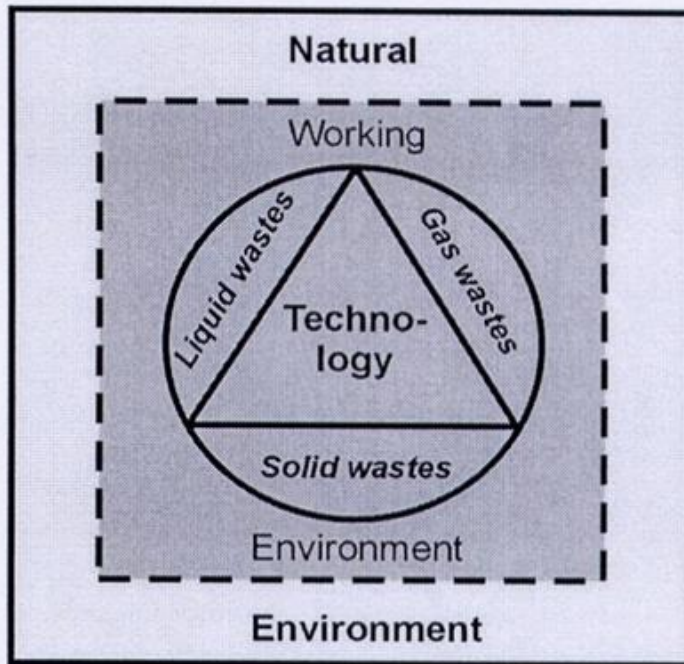
Technology is one of main factors, which influences on quality of products



Chosen examples of new kinds of technology

No.	Kind of technology	Elements
1.	Modern materials	Biomaterials, diamond coatings, modern polymers, intermetallic alloys, composite materials
2.	Numerical technology of image	Image processing, data compression, high resolution systems
3.	Modern computational methods	Modular software, computer simulation, neural networks
4.	Optoelectronics	Light pipes, lasers, optical computers
5.	Artificial intelligence	Intelligent machines, expert systems, genetic algorithms
6.	Flexible manufacturing systems	Computer integrated manufacturing (CIM), computer integrated designing (CAD)
7.	Sensor technology	Active/passive sensors, optical sensors
8.	Biotechnology	Bioelectronics, Genetic engineering

The technology and realization of technological processes is in relationship with elements of working and natural environments.



The technological process, based on clean technology should tend to reducing or minimizing the amount of:

- *resources consumed;*
- *waste and emissions generated;*
- *the hazards of the waste and emissions generated (mainly by usage substitution of input materials);*
- *the risk of accident or malfunction.*



No.	Stage	Contents
1.	Improvement of cleaning methods	<ul style="list-style-type: none"> • improvement of measuring methods • investigation of new cleaning method
2.	Reduction of wastes stream	<ul style="list-style-type: none"> • modification of technology, production process, machines • introduction of effective steering systems • modification of materials • reduction of water, energy and raw materials consumption
3.	Designing of ecological products	<ul style="list-style-type: none"> • planning of life cycle of products • designing of products in recycling aspects
4.	Formation of new infrastructure forms	<ul style="list-style-type: none"> • modification of energy using systems • modification in range of transport and communication
5.	Integration of technical sciences	<ul style="list-style-type: none"> • joining of new technical disciplines

Environmental technology is usually connected with the design and analysis of complex, integrated management systems and sustainable development in the areas of:

- *role of the design in the operations of environmental technology, control of integrated environmental systems,*
- *role of computer methods in the operation and control of environmental systems,*
- *education and training requirements to provide efficient operation and maintenance of complex environmental systems in range of clean technology.*



**Sustainable
development**



**Cleaner
production**



Recycling



Cleaning



Dilution

CONCLUSION

The minimization of waste and emissions and reductions in material and energy inputs are the most important environmental aims. Sustainable technological development and innovations do not automatically lead to total reduction of environmental burden of industrial production. However, technological innovation is an important factor and seems to play a central role in the long-term initiation of cleaner production.

Environmental improvement of company's strategy by application the idea of cleaner production linked with sustainable technologies leads to produce of environmentally friendly products and moreover leads to increase the company position on the market. Cleaner products must be given an essentially stronger meaning in the future because of the necessary transition to sustainable economy and development.

Sustainable development and idea of cleaner production is a central target in environmental science and plays a key role in the growth of global economies. Therefore, modern industrial and manufacturing companies should apply technologies designed to minimize pollution and use of finite resources. These technologies tend to improve the global environment and humans life.